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Schaible et al.

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(54) **METHOD AND APPARATUS FOR MAKING SOAP**

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B01J 10/00	(2006.01)
C11D 13/10	(2006.01)
C11D 13/02	(2006.01)

(52) **U.S. Cl.**

CPC ***C11D 13/16*** (2013.01); ***C11D 13/02*** (2013.01); ***C11D 13/10*** (2013.01)

(58) **Field of Classification Search**

CPC C11D 13/16; C11D 13/02; C11D 13/10; B01J 10/00; B01J 12/00; B01J 14/00; B01J 15/00; B01J 16/00; B01J 19/00; B01J 8/00

USPC 422/129; 554/156, 158

See application file for complete search history.

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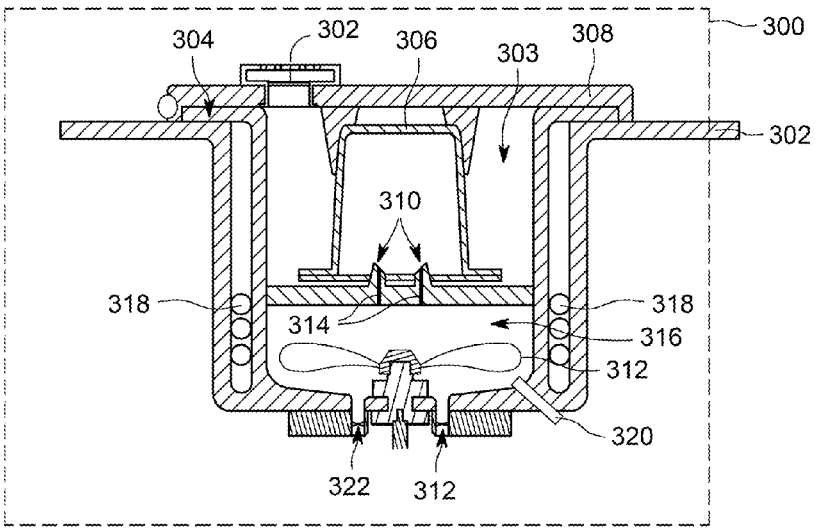
(57) **ABSTRACT**

The present invention is directed towards a method and apparatus for making soap. According to one embodiment, a soap making apparatus comprises a water vessel that holds water, an oil vessel that holds an oil mixture, a lye container that accepts enclosed lye capsules and a microcontroller that controls a mixture of ingredients that is discharged from the water vessel, oil vessel and lye vessel to produce one or more soap bars made.

15 Claims, 3 Drawing Sheets



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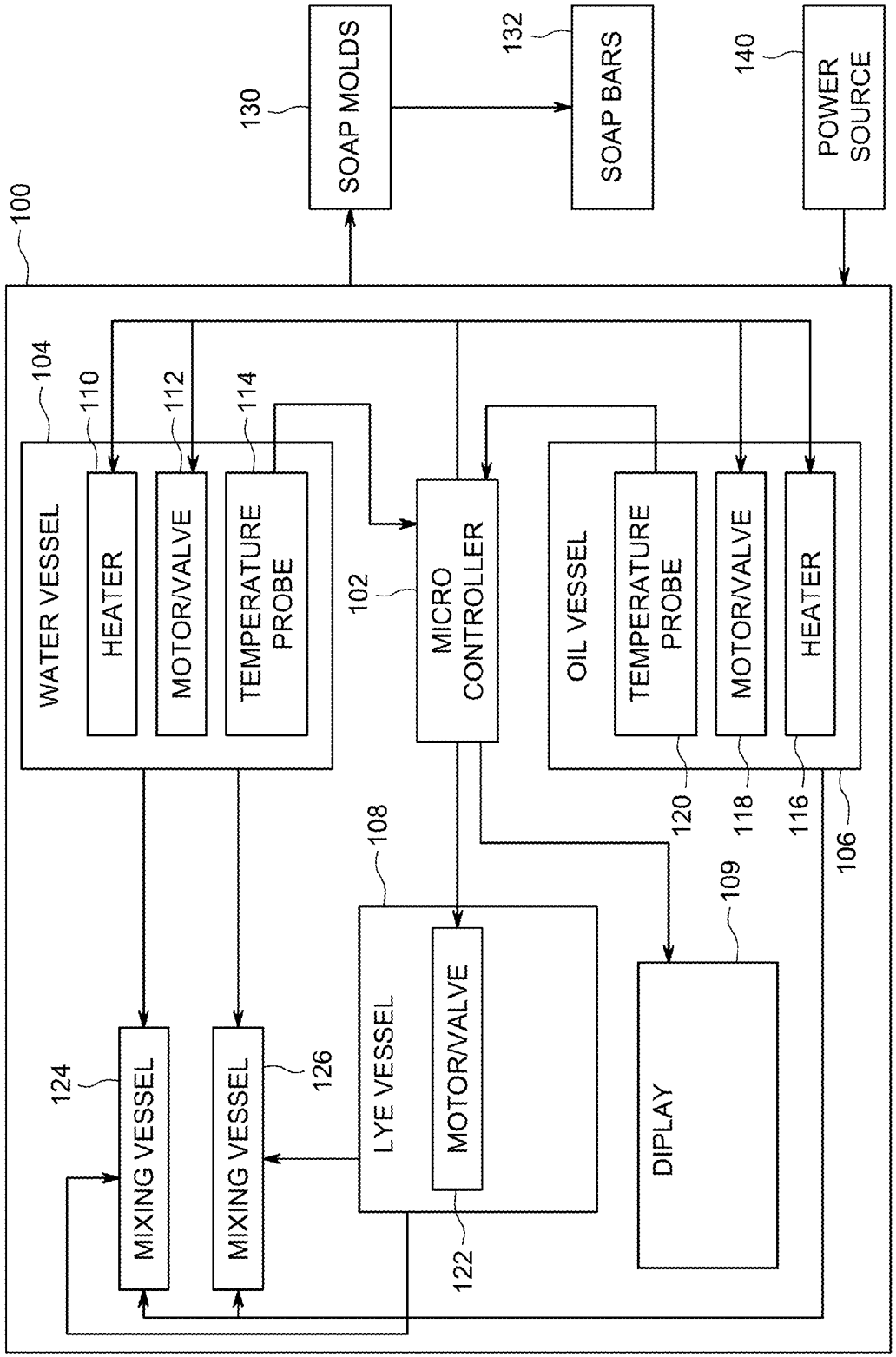
100
130
SOAP MOLDS
132
SOAP BARS
140
POWER SOURCE
104
110
112
114
WATER VESSEL
HEATER
MOTOR/VALVE
TEMPERATURE PROBE
102
MICRO CONTROLLER
OIL VESSEL
TEMPERATURE PROBE
MOTOR/VALVE
HEATER
120
118
116
106
108
109
124
126
MIXING VESSEL
MIXING VESSEL
LYE VESSEL
MOTOR/VALVE
DIPLAY
122

FIG. 1

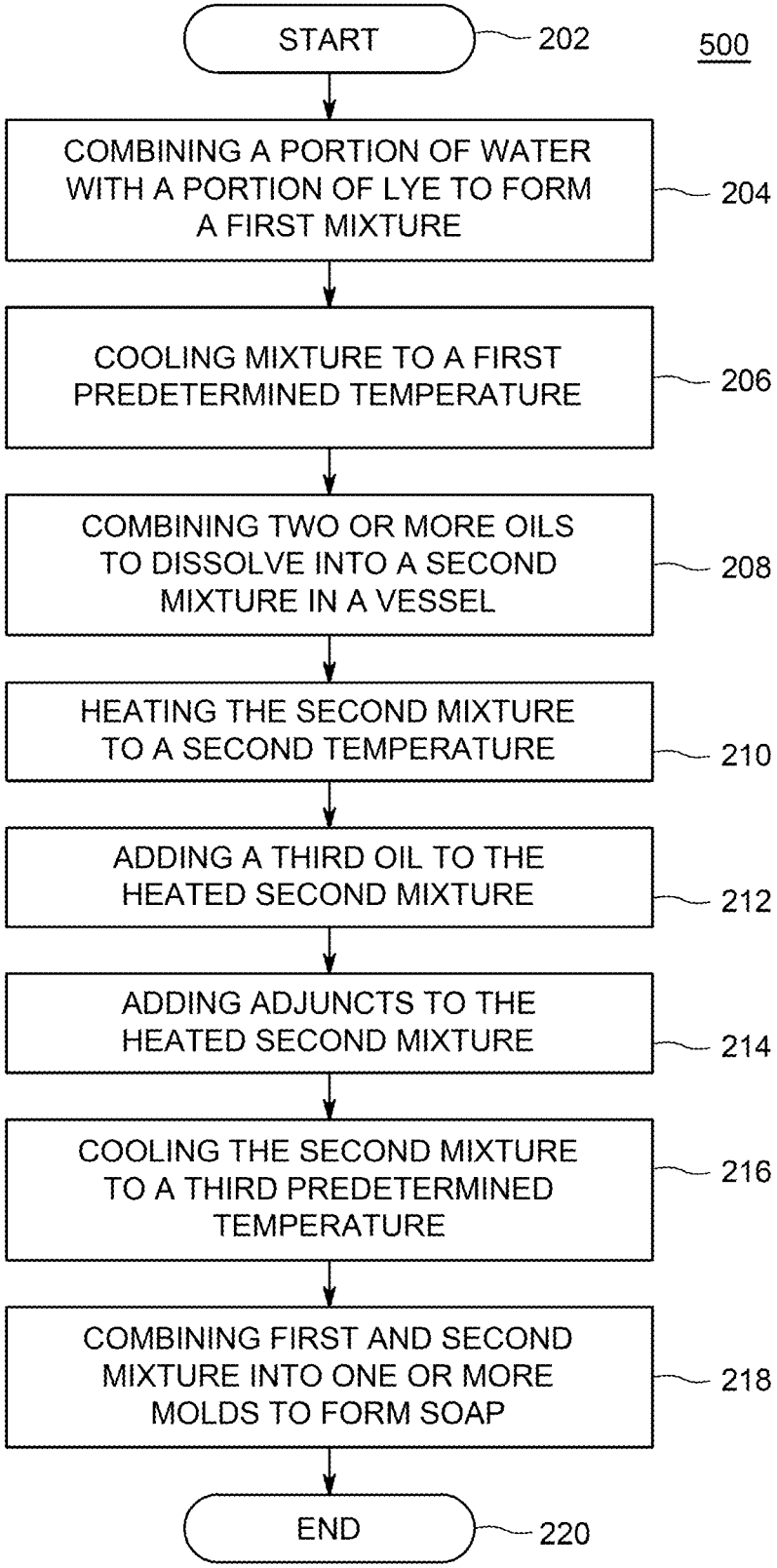
START
202
500
COMBINING A PORTION OF WATER WITH A PORTION OF LYE TO FORM A FIRST MIXTURE
204
COOLING MIXTURE TO A FIRST PREDETERMINED TEMPERATURE
206
COMBINING TWO OR MORE OILS TO DISSOLVE INTO A SECOND MIXTURE IN A VESSEL
208
HEATING THE SECOND MIXTURE TO A SECOND TEMPERATURE
210
ADDING A THIRD OIL TO THE HEATED SECOND MIXTURE
212
ADDING ADJUNCTS TO THE HEATED SECOND MIXTURE
214
COOLING THE SECOND MIXTURE TO A THIRD PREDETERMINED TEMPERATURE
216
COMBINING FIRST AND SECOND MIXTURE INTO ONE OR MORE MOLDS TO FORM SOAP
218
END
220

FIG. 2

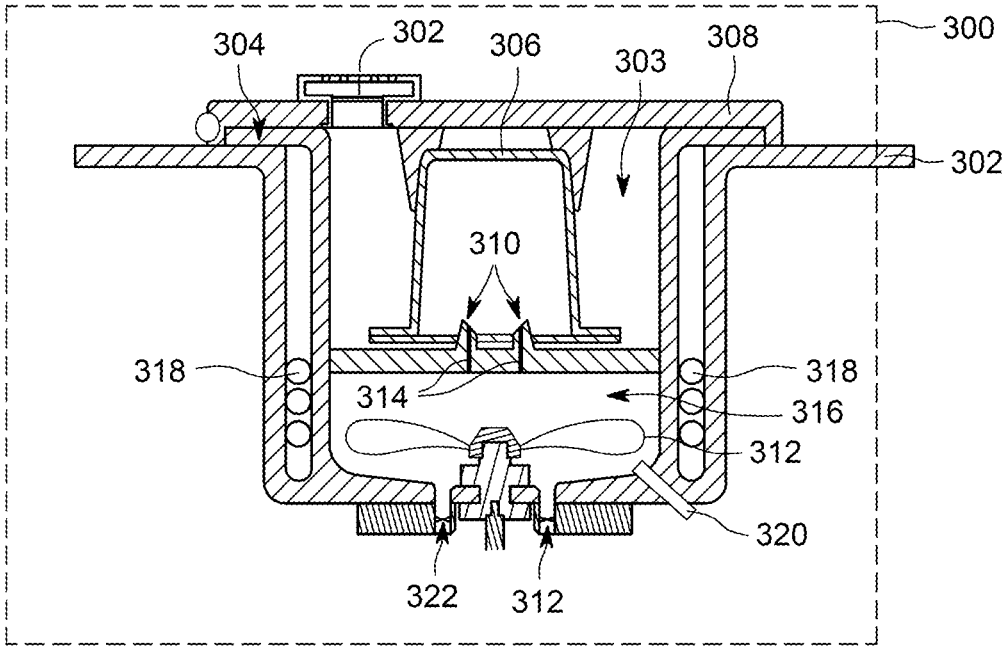
300
304
302
306
303
308
302
310
318
318
314
316
312
320
322
312

FIG. 3

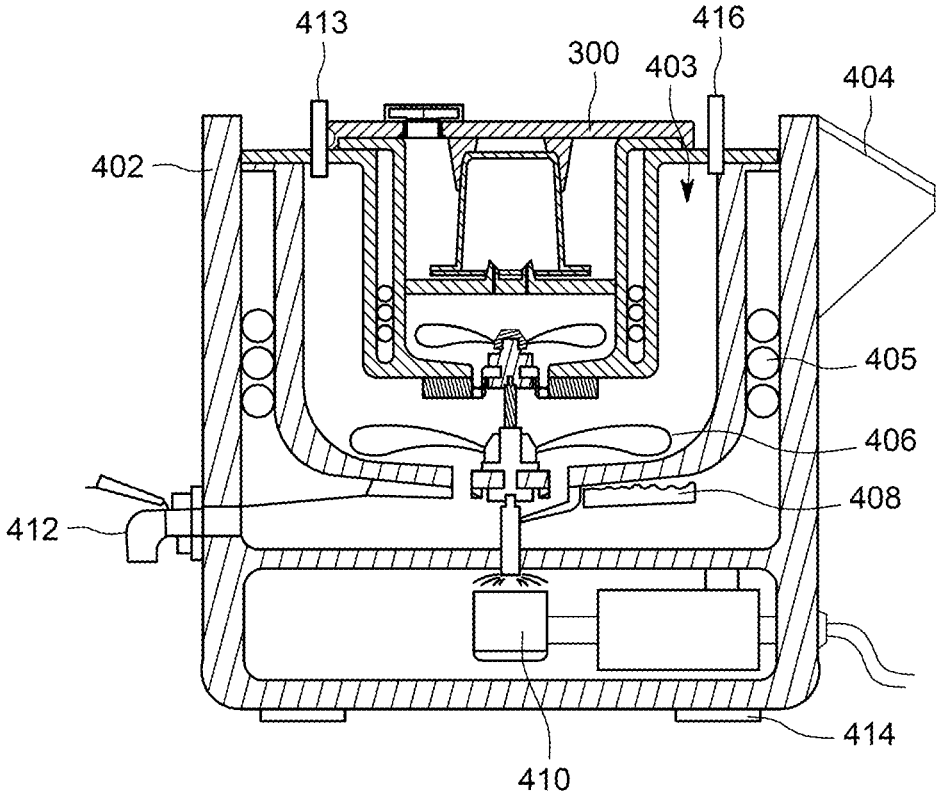
413
416
300
403
404
402
405
406
408
412
414
410

FIG. 4

METHOD AND APPARATUS FOR MAKING SOAP

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of priority to U.S. Provisional Patent Application Ser. No. 62/010,762 filed on Jun. 11, 2014 and entitled "METHOD AND APPARATUS FOR MAKING SOAP", which is herein incorporated in its entirety by reference.

BACKGROUND

1. Field of the Invention

The present disclosure generally relates to a method and apparatus for making soap.

2. Description of the Related Art

The manufacture of soap is a dangerous and difficult process and has accordingly generally been limited to commercial production. However, recently, enthusiasts have begun making soap at home using well known manual processes. However, the known manual processes of making soap at home tend to be complex and potentially dangerous to the soap-maker. Often, these manual processes use lye in making soap. When lye is combined with high water temperatures, a chemical reaction takes place which could create a fatal hazard for the soap-maker.

Further, precise control over the ingredients in soap-making is required to make soap with the proper pH balance. Controlling temperatures of oils, chemicals and water at each stage in the process of making the soap becomes difficult and could result in incorrect acidity. Other undesirable properties may also emerge while attempting to create soap in a home laboratory. If the manufacture deviates from known processes even slightly, the soap-maker must use additional ingredients, wasting time and resources.

Accordingly, there exists a need for a method and apparatus for easing the process of making soap in a non-commercial setting.

SUMMARY

A soap making apparatus is provided substantially as shown in and/or described in connection with at least one of the figures, as set forth more completely in the claims.

These and other features and advantages of the present disclosure may be appreciated from a review of the following detailed description of the present disclosure, along with the accompanying figures in which like reference numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

FIG. **1** is a block diagram of an apparatus for making soap in accordance with exemplary embodiments of the present invention;

FIG. **2** is a flow diagram of a method for making soap in accordance with exemplary embodiments of the present invention;

FIG. **3** is an illustration of a soap making apparatus, in accordance with exemplary embodiments of the present invention; and

FIG. **4** illustrates a soap making apparatus in accordance with exemplary embodiments of the present invention.

DETAILED DESCRIPTION

So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

According to exemplary embodiments of the present invention, a soap making apparatus is provided. The soap making apparatus compartmentalizes the water, the lye and the oil vessels, keeping each separate from the other. The lye vessel is manually loaded with lye manually added lye capsules, enclosed so as to avoid direct skin contact. A microcontroller controls the temperature and release of each of the vessels independently. The microcontroller also controls the mixing portions of each element and is configurable modify quantities or proportions of lye, oil and water.

FIG. **1** is a block diagram of a soap making apparatus (SMA) **100** in accordance with exemplary embodiments of the present invention. The SMA **100** comprises a microcontroller **102**, a water vessel **104**, an oil vessel **106**, a lye vessel **108** and a display **109**. The SMA **100** creates a mixture using the ingredients from the various vessels into mixing vessel **124** and mixing vessel **126** and discharges the mixture into one or more soap molds **130**. The soap molds form the mixture into one or more soap bars **132**. The SMA **100** is powered via a power source **140**. Those of ordinary skill in the art will recognize that the power source may be any standard power source.

The water vessel **104** comprises a heater **110**, a motor and valve **112** and a temperature probe **114**. The oil vessel **106** comprises a heater **116**, a motor/valve **118** and a temperature probe **120**. The lye vessel **108** comprises a motor/valve **122**. The microcontroller **102** controls the operation of the water vessel **104**, the oil vessel **106**, the lye vessel **108** and the display **109**. The microcontroller **102** may be programmed with instructions on how and when to mix each ingredient: lye, water and oil, in the proper amounts to produce a mixture with the correct properties.

According to one embodiment, the microcontroller **102** controls the water vessel **104** to put a particular amount (e.g., 135 g) of water into mixing vessel **124**. The microcontroller **102** then controls the lye vessel **108** to put an amount (e.g., 35 g) of lye into the mixing vessel **124**. This creates an exothermic reaction and the temperature reaches approximately 180 F. The mixed water and lye in the first mixing vessel **124** are cooled to approximately 70 to 80 F for approximately 15-20 minutes. The temperature probe **114** monitors the temperature of the mixing vessel **124**.

The oil vessel **106** is loaded with a proportion of palm oil and coconut oil, according to the user preference. In one embodiment, an amount (e.g., 68 g) of palm oil and an amount (e.g., 114 g) of coconut oil are dissolved in the oil vessel **106**. The microcontroller controls the oil vessel **106**

to be heated by the heater **116** to approximately 180 F and stirred by a stirring mechanism (known to those in the art) for approximately fifteen minutes. Once the mixture is heated to the desired temperature as determined by the temperature probe **120**, adjuncts may be added to the mixture, such as color, aroma, or the like. The mixture in vessel **106** is combined with the mixture in mixing vessel **124** into mixing vessel **126**. The final mixture is cooled to approximately to 70-80 F as determined by the temperature probe **120** and tracing occurs. Those of ordinary skill in the art will recognize that tracing generally occurs when the soap has reached emulsification or, in other words, tracing occurs when the oils and lye water are in solution and will no longer separate. Traces refer to visual cues that can be seen on the surface of the mixture and can be described as a trace of a slightly different color than the general mixture. Subsequently, the final mixture is directed towards the one or more soap molds **130** by the microcontroller **102**, producing one or more soap bars **132**.

FIG. **2** is a flow diagram of a method **200** for making soap in accordance with exemplary embodiments of the present invention. The method is controlled by the microcontroller **102** and performed by various components of the soap making apparatus **100**.

The method begins at step **202** and proceeds to step **204**. At step **204**, a portion of water is combined with a portion of lye to form a first mixture. According to some embodiments, an amount (e.g., 135 g) of water is used and an amount (e.g., 35 g) of lye is used.

At step **206**, the water and lye, collectively the first mixture is stored in a separate area and cooled from approximately 180° Fahrenheit to approximately 70-80° F. This process generally spans fifteen to twenty minutes, but may take more or less time according to the mixture quantities.

At step **208**, two or more oils are combined to be dissolved into a second mixture in another vessel. For example, an amount (e.g., 68 g) of palm oil and an amount (114 g) of coconut oil are dissolved together. At step **210**, the second mixture is heated to a second temperature. In exemplary embodiments, the second temperature is approximately 180° F., though this may differ based on quantities. The heating may take approximately 15 minutes of stirring of the second mixture. At step **212**, a third oil, e.g. olive oil, is added to the heated second mixture. In some embodiments, an amount (e.g., 182 g) of olive oil is used. At step **214**, adjuncts are added to the heated second mixture. The adjuncts comprise the various colors, scents, aromas, and other ingredients that can be used to customize the soap. At step **216**, the second mixture is cooled to 70-80° F. by stirring the mixture for approximately 15-20 minutes. The first mixture and the second mixture are combined together at step **218** to form a final mixture, and the final mixture is poured into one or more soap molds. The soap molds are cooled to form soap bars. The method terminates at step **220**.

FIG. **3** is an illustration of a lye container **300**, in accordance with exemplary embodiments of the present invention.

The lye container **300** comprises a vent **302**, a lye cavity **303**, containment vessel **304**, an insertable/removable lye vessel **306**, a lid **308**, piercing mechanism **310**, a stirring mechanism **312**, one or more valves **314**, a water chamber **316** and cooling coils **318**. The lye container **300** fits into the soap making apparatus shown in FIG. **4**. The vent **302** vents excess heat or other gases from the lye cavity **303**. In some embodiments there may be one or more vents.

According to one embodiment, the lid **308** rotates off, exposing the lye cavity **303**. Once the lid **308** exposes the lye cavity **303**, a particular amount of water, as described above in reference to FIG. **2**, is poured into the cavity. The water drains from the lye cavity **303** into the water chamber **316** via the one or more valves **314**. In other embodiments, the valves **314** may be realized as small holes at the bottom of the lye cavity **303** which allow the water to fall through to the water chamber **316**.

Once the particular amount of water is poured into the lye cavity **303**, a lye vessel, e.g. lye vessel **306**, is inserted, in some instances, up-side down, into the lye cavity **303**. The lye vessel **306** may be shaped in the form of a pouch, cup, or other form. Those of ordinary skill in the art will recognize that the lye vessel **306** may be formed in any shape acceptable by design in the lye containment vessel **304** and is not limited to the particular shape shown in FIG. **3** and FIG. **4**. According to one embodiment, the lye vessel **306** may have a foil or polyester top cover, or a cover made of any easily piercable, yet durable material. Similarly, in some embodiments, the lye containment vessel **304** is designed to fit various shapes of lye vessels to accommodate variations in size, structure, or the like. Those of ordinary skill in the art also recognize that the lye containment vessel **304** is designed to position the lye vessel **306** above the piercing mechanism **310**. In some embodiments, guides are built into the lye containment vessel **304** to guide the lye vessel **306** into a proper position for operation of the soap making apparatus.

After the lye vessel **306** is inserted into the lye cavity in the correct position, the lid is closed and forces the lye vessel **306** to be pierced by the piercing mechanism **310**. Once pierced, the lye vessel **306** excretes the lye contained therein, and the lye flows through the valves **314** into the water chamber **316**. In this embodiment, the valves **314** are built into the piercing mechanism **310**, however, as described above, the valves **314** may comprise a series of holes in the lye containment vessel **304**, and the piercing mechanism **310** may pierce the lye vessel **306** on any of its sides, allowing the lye into the lye cavity **303**.

The lye may then be drained through the series of holes into the water chamber **316**. In some embodiments, the valves **314** may comprise feed tubes which allow the lye into the water chamber **316**. In some embodiments, a switching mechanism is used to perform the piercing of the lye vessel **306**, so that the piercing can take place after the lid is fully closed, or at a user's request.

The lye and water mixture in the water chamber **316** is stirred by the stirring mechanism **312** causing an exothermic reaction where the mixture rises to a temperature of approximately 180° F. and releases a gaseous mix. According to exemplary embodiments, the stirring mechanism has one or more blades, or may be replaced with a magnetic bead for mixing. Those of ordinary skill in the art will recognize that any mechanism which stirs the lye and water together may be used as the stirring mechanism **312**.

The gaseous mix may be vented through holes between the lye containment vessel **304** and the water chamber **316** and vented out through the vent **302**. In other embodiments, there may be a venting tube allowing for direct venting directly coupled from the water chamber **316** to the vent **302**. The temperature of the mixture in the water chamber **316** is measured by a thermocoupler **320** and when the temperature is nearing 90° F., the thermocoupler may direct a microcontroller to slow down or shut off the stirring mechanism **312** entirely, enable the cooling coils **318** or cause a display (as shown in FIG. **4**) to indicate that the lye/water mixture has cooled. Accordingly, the water and lye mixture may be cooled by the cooling coils **318** to approxi-

mately 90° F. In one embodiment, the cooling coils **318** are replaced by an inlet water pipe coupled to an external water source such as a water line, faucet, or the like. The inlet water pipe allows water to circulate around the water chamber **316**, cooling the mixture in the water chamber **316** to the desired temperature.

FIG. **4** illustrates a soap making apparatus (SMA) **400** in accordance with exemplary embodiments of the present invention.

The SMA **400** comprises the lye container **300** shown in FIG. **3** and an outer soap vessel **402**. The outer soap vessel **402** comprises a soap chamber **403**, a control and display section **404**, cooling coils **405**, a stirring mechanism **406**, a heating element **408** a motor **410** and an outlet **412** for soap molds. In exemplary embodiments of the SMA **400**, the SMA **400** optionally comprises device feet **414**. The SMA **400** is powered electrically via an AC power inlet.

The lye container **300** is designed to fit into the soap chamber **403** of the outer soap vessel **402**. A user can first place soap ingredients into the soap chamber **403** before creating the lye and water mixture, or may be input while the lye mixture is being stirred via input **416**. According to one embodiment, the lye and water mixture contained in the water chamber **316** is siphoned through valve **322** into the soap chamber **403** where it is mixed with other soap ingredients as described in reference to FIG. **2**, when the lye container **300** is placed into the soap chamber **403**.

The other soap ingredients are fed into the outer soap vessel via an input **416**, or before the lye container **300** is inserted into the body of outer soap vessel **402**. Optionally, the lye container can be initially removed from the SMA **400** and the soap ingredients, such as scents, oils and the like, may be directly poured into the soap chamber **403**. Then, the lye container **300** is attached to the outer soap vessel **402** and the microcontroller opens the valves **322** of the lye container **300** permitting the lye and water mixture to mix with the soap ingredients.

The microcontroller then controls the stirring mechanism **406** to stir the lye and water mixture with the other soap ingredients. The heating element **408** heats the mixture up to a particular temperature as described in reference to FIG. **2** to liquefy all of the ingredients. A thermocoupler **413** measures the temperature and allows the microcontroller to act accordingly. Once the mixture has reached the desired temperature as determined by the thermocoupler **413** and cool-down has completed, the outlet **412** is opened by the microcontroller and the mixture is output at the outlet **412**.

Those of ordinary skill in the art will recognize that the outlet **412** may be a spigot or the like and may output into various soap molds provided by the user. The various stages of the process may be displayed and/or controlled by control and display section **404**. The motor **410** controls the stirring mechanism **406** which may optionally couple with the stirring mechanism **312**, so they are controlled via a single motor.

While the invention has been described in conjunction with specific embodiments thereof, it is evident that alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit and broad scope of the described invention.

The invention claimed is:

1. A soap making apparatus comprising:
- a water vessel that holds water;
- an oil vessel that holds an oil mixture;
- a lye container that accepts enclosed lye capsules, the lye container comprising:
  - a containment vessel;
  - an insertable and removable lye vessel containing the enclosed lye capsule;
  - a lid that covers the lye container;
  - a piercing mechanism;
  - a valve; and
  - a vent that vents excess heat from the lye container,
  - wherein upon closing the lid, the piercing mechanism pierces the enclosed lye capsule to excrete lye into the water vessel via the valve; and
- a microcontroller that controls a mixture of ingredients that is discharged from the water vessel, oil vessel and lye vessel to produce one or more soap bars made.

2. The soap making apparatus of claim **1**, further comprising:
- a first mixing vessel that receives the water and the lye as a first mixture; and
- a second mixing vessel that receives the oil mixture and the first mixture.

3. The soap making apparatus of claim **2**, the lye container further comprising:
- a motor; and
- a valve, coupled to the microcontroller, for releasing the lye into the first mixing vessel.

4. The soap making apparatus of claim **3**, wherein the lye is released in a predetermined portion.

5. The soap making apparatus of claim **4**, wherein the predetermined portion is approximately 35 g.

6. The soap making apparatus of claim **2**, the water vessel further comprising:
- a heater that heads the water;
- a valve, coupled to the microcontroller, for releasing the water; and
- a temperature probe, coupled to the microcontroller and the valve, that signals the valve to open at a predetermined water temperature.

7. The soap making apparatus of claim **6**, wherein the water is released from the water vessel via the valve into the first mixing vessel in a predetermined portion.

8. The soap making apparatus of claim **7**, wherein the predetermined portion is approximately 135 g.

9. The soap making apparatus of claim **2**, wherein the water is released first into the first mixing vessel, and then the lye is released into the first mixing vessel.

10. The soap making apparatus of claim **2**, wherein the first mixture is cooled in the first mixing vessel to approximately 70° F. to 80° F. as measured by a temperature probe for approximately fifteen to twenty minutes.

11. The soap making apparatus of claim **10**, wherein the oil mixture in the oil vessel is heated to approximately 180° F. and stirred for approximately 15 minutes by a heater and stirring mechanism controlled by the microcontroller.

12. The soap making apparatus of claim **11**, wherein adjuncts are accepted in the oil mixture before the oil mixture and the first mixture are received in the second mixing vessel.

13. The soap making apparatus of claim **2**, wherein the oil mixture and the first mixture are combined to produce a second mixture.

14. The soap making apparatus of claim **13**, wherein the second mixture is cooled in the second mixing vessel by a heater to a predetermined temperature controlled by the microcontroller until tracing occurs.

15. The soap making apparatus of claim **14**, wherein the predetermined temperature is approximately 70° F. to 80° F.

* * * * *